Spall strength measurements of epoxy resin with varying content of polyphenylene sulfone

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The utilization of thermoplastic materials has proven to be of interest for a multitude of applications. They can be employed as binders in polymer composites for structural purposes and can also be used as additives to existing highly heat-resistant but brittle thermosetting binders. The incorporation of materials such as polysulfone, functioning as a modifier, into epoxy binders has the potential to markedly enhance the crack resistance of the material. The present study has therefore been undertaken to experimentally investigate and assess the effect of the polyphenylene sulfone additive on the strength of epoxy resin. It has been previously established that, in static conditions, the addition of 5 percent polyphenylene sulfone to epoxy resin results in an increase of its strength. In this study, the spall strength of the epoxy resin samples was found to decrease with increasing polyphenylene sulfone addition under dynamic loading conditions. The attenuation of velocity oscillations in the spall plate is observed to vary with differing polyphenylene sulfone content. This finding indicates that the fracture kinetics and viscosity of the samples are distinct. The gradient of the spall pulse front is determined by the rate of pore growth when the material undergoes destruction, thus suggesting that the rate of failure may increase with the incorporation of polyphenylene sulfone content.

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